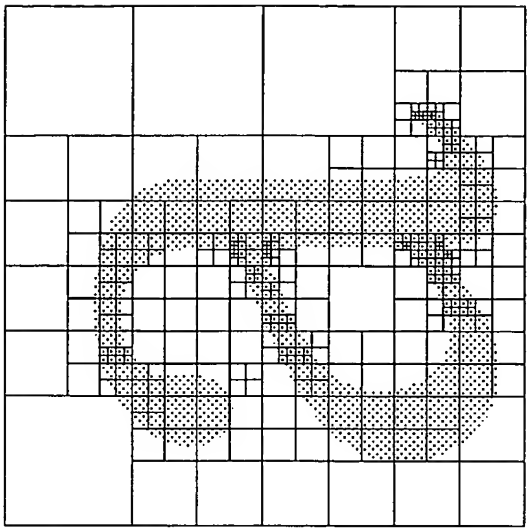


Fig. 2A

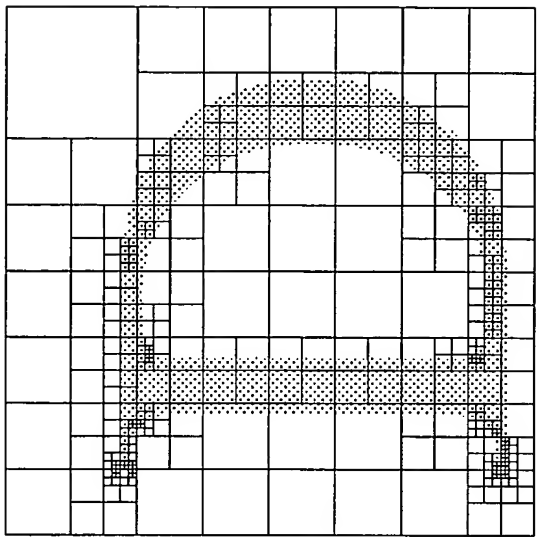


Fig. 2B

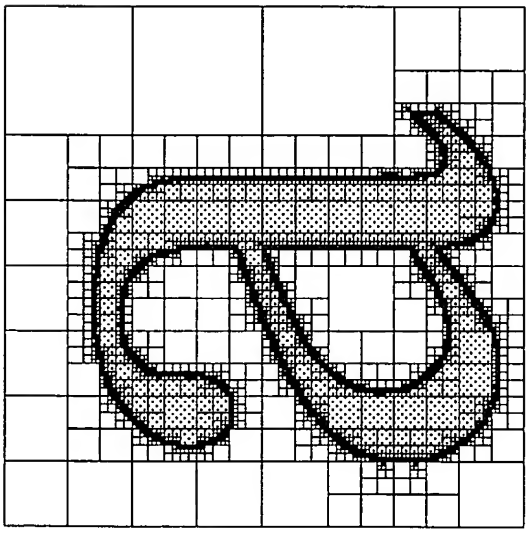


Fig. 1A

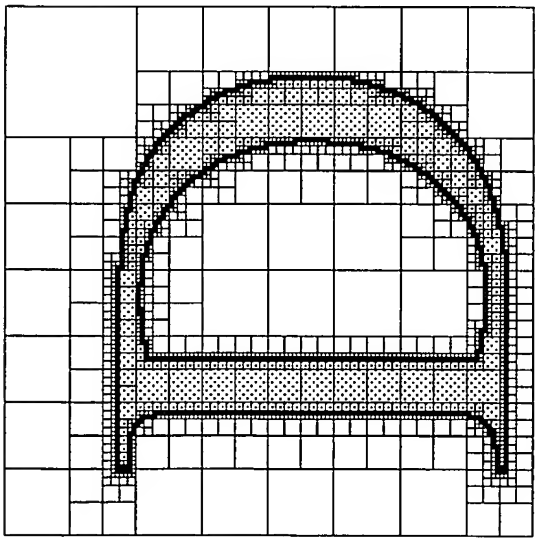


Fig. 1B

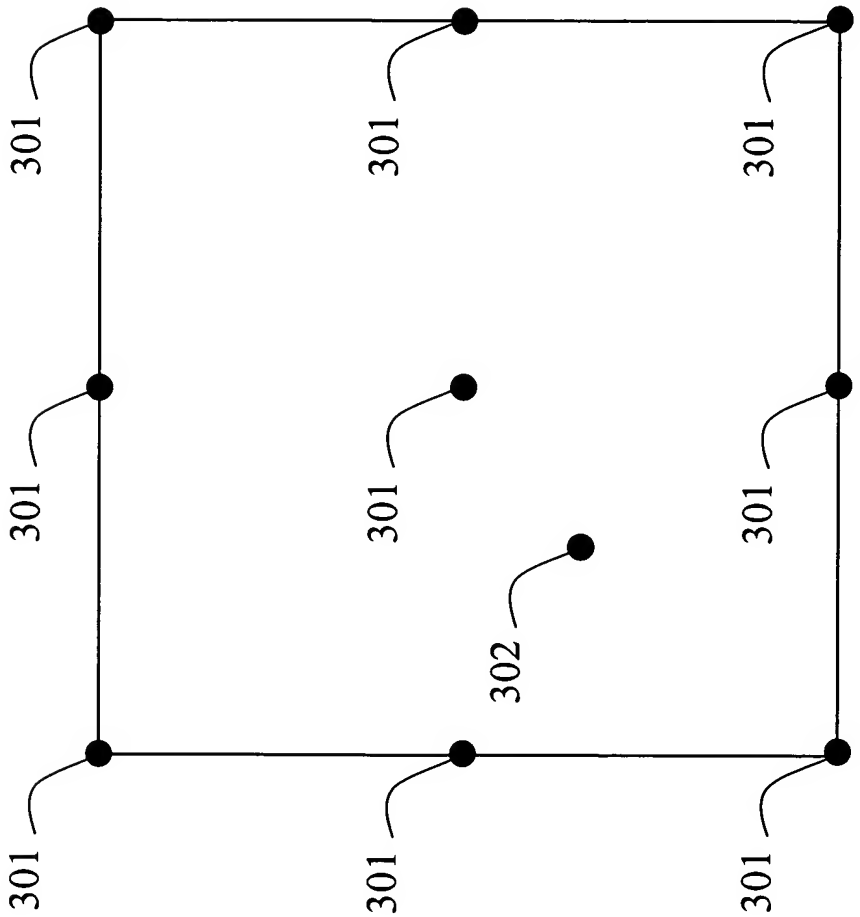
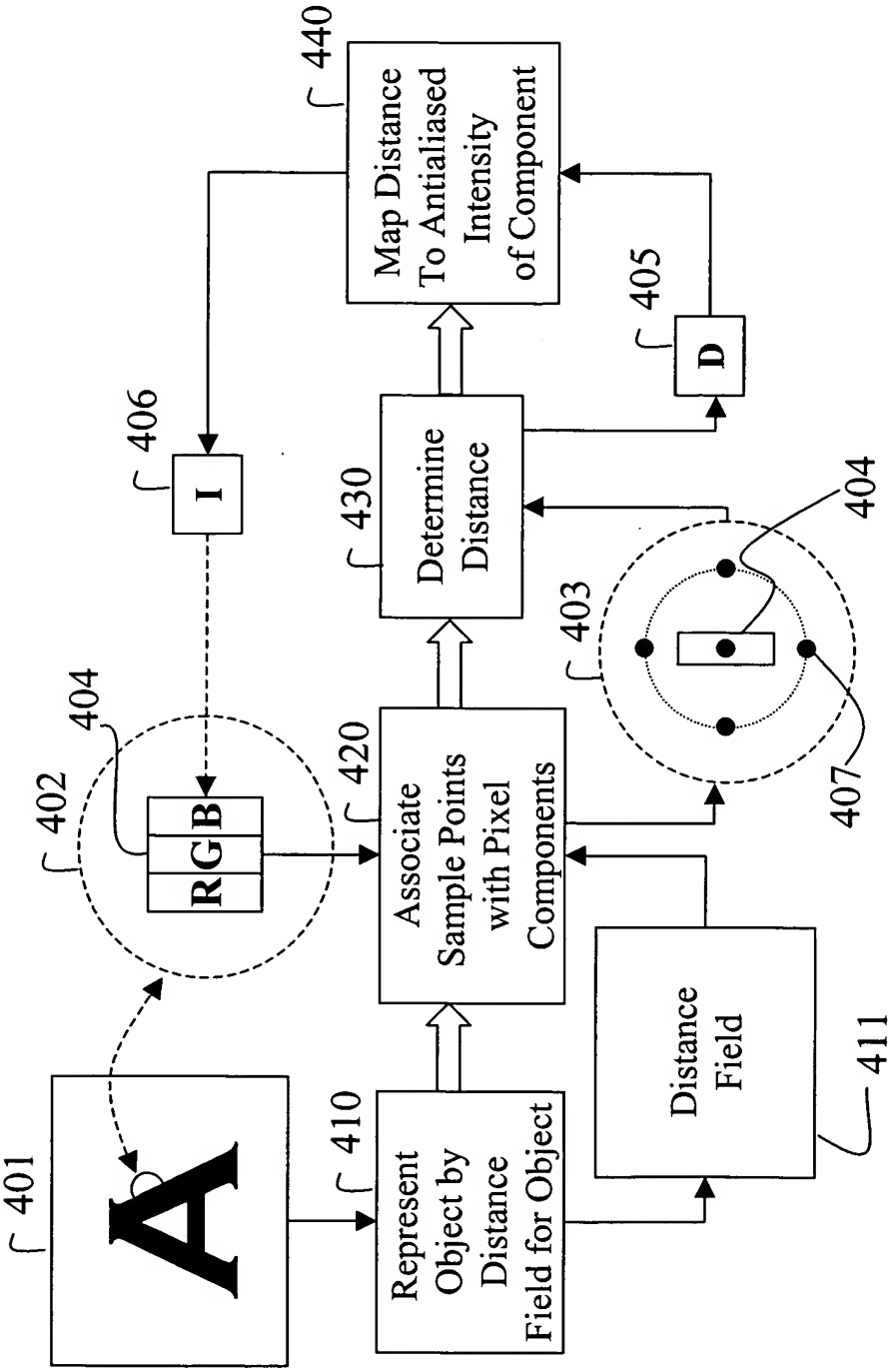
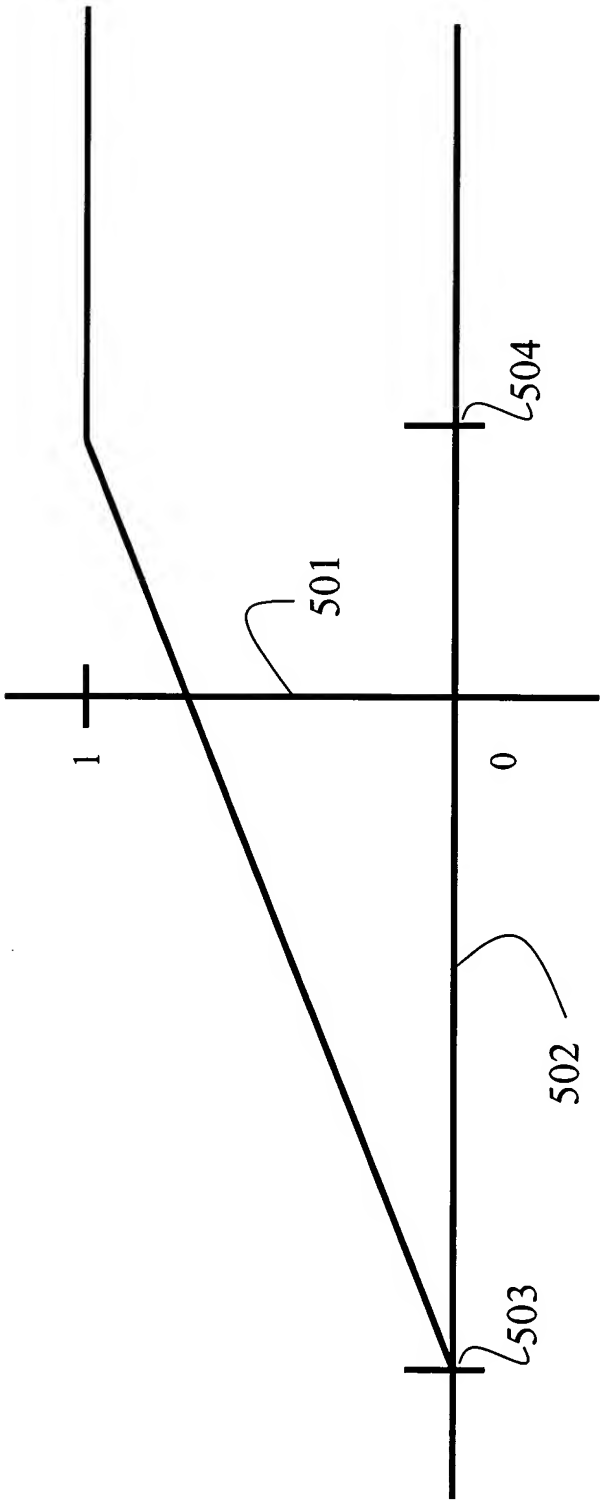


Fig. 3


401
A
410
Represent Object by Distance Field for Object
411
Distance Field
420
Associate Sample Points with Pixel Components
402
RGB
404
403
407
430
Determine Distance
406
I
405
D
440
Map Distance To Antialiased Intensity of Component

400

Fig. 4



500

Fig. 5

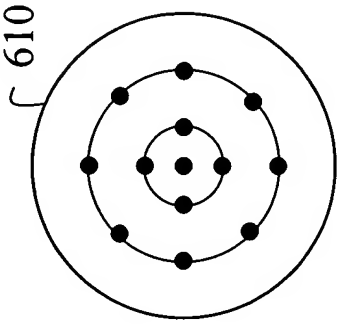


Fig. 6C

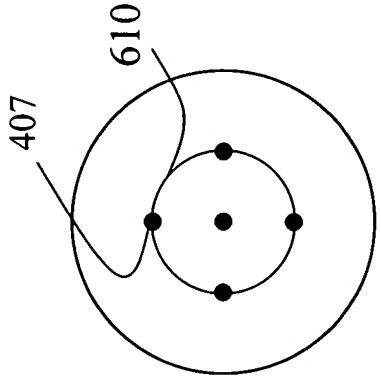


Fig. 6B

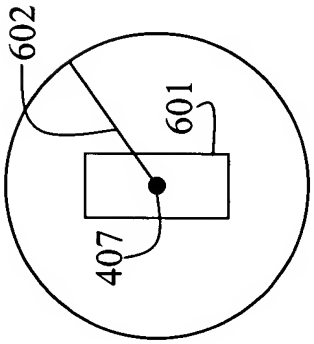


Fig. 6A

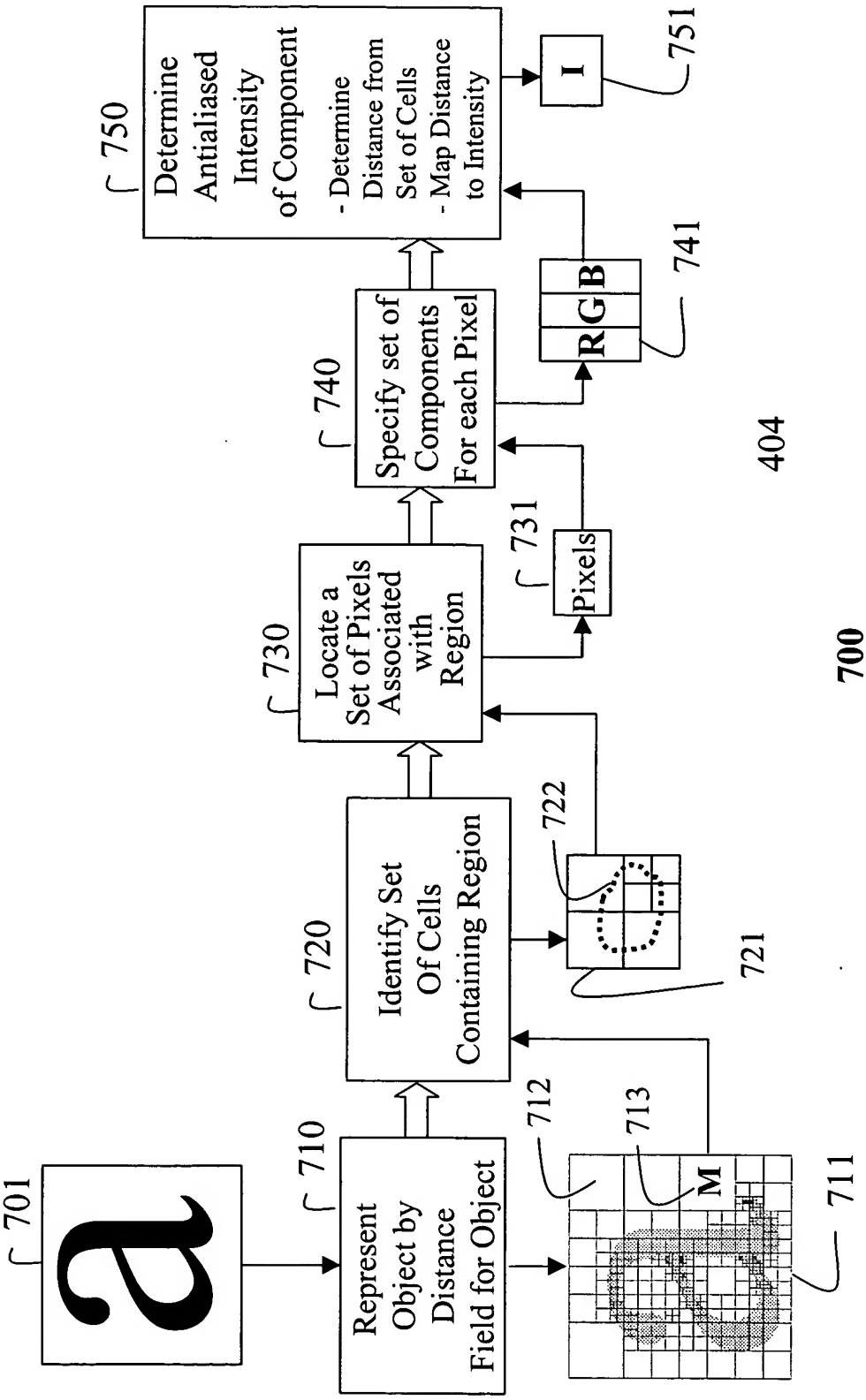
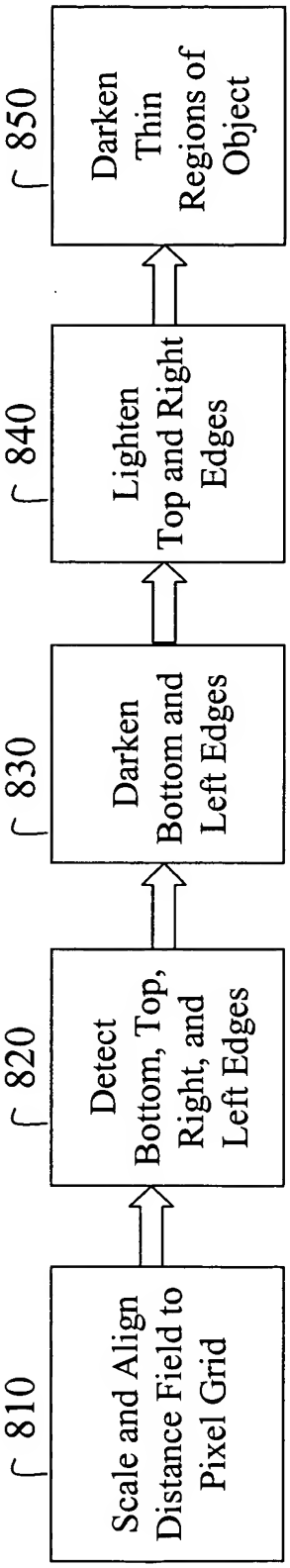

701
710
Represent Object by Distance Field for Object
712
713
M
711
720
Identify Set Of Cells Containing Region
722
721
730
Locate a Set of Pixels Associated with Region
731
Pixels
740
Specify set of Components For each Pixel
741
R G B
750
Determine Antialiased Intensity of Component
- Determine Distance from Set of Cells
- Map Distance to Intensity
I
751
404
700

Fig. 7


810
Scale and Align Distance Field to Pixel Grid
820
Detect Bottom, Top, Right, and Left Edges
830
Darken Bottom and Left Edges
840
Lighten Top and Right Edges
850
Darken Thin Regions of Object

800

Fig. 8

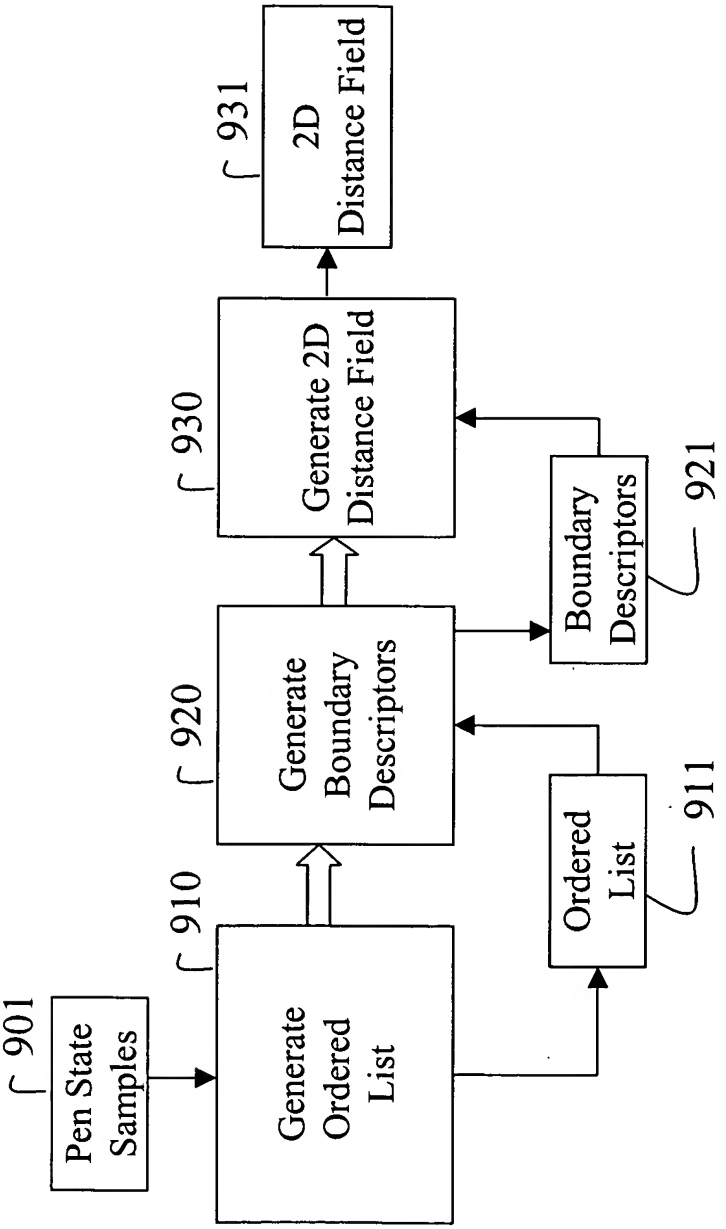

901
Pen State Samples
910
Generate Ordered List
911
Ordered List
920
Generate Boundary Descriptors
921
Boundary Descriptors
930
Generate 2D Distance Field
931
2D Distance Field
900

Fig. 9

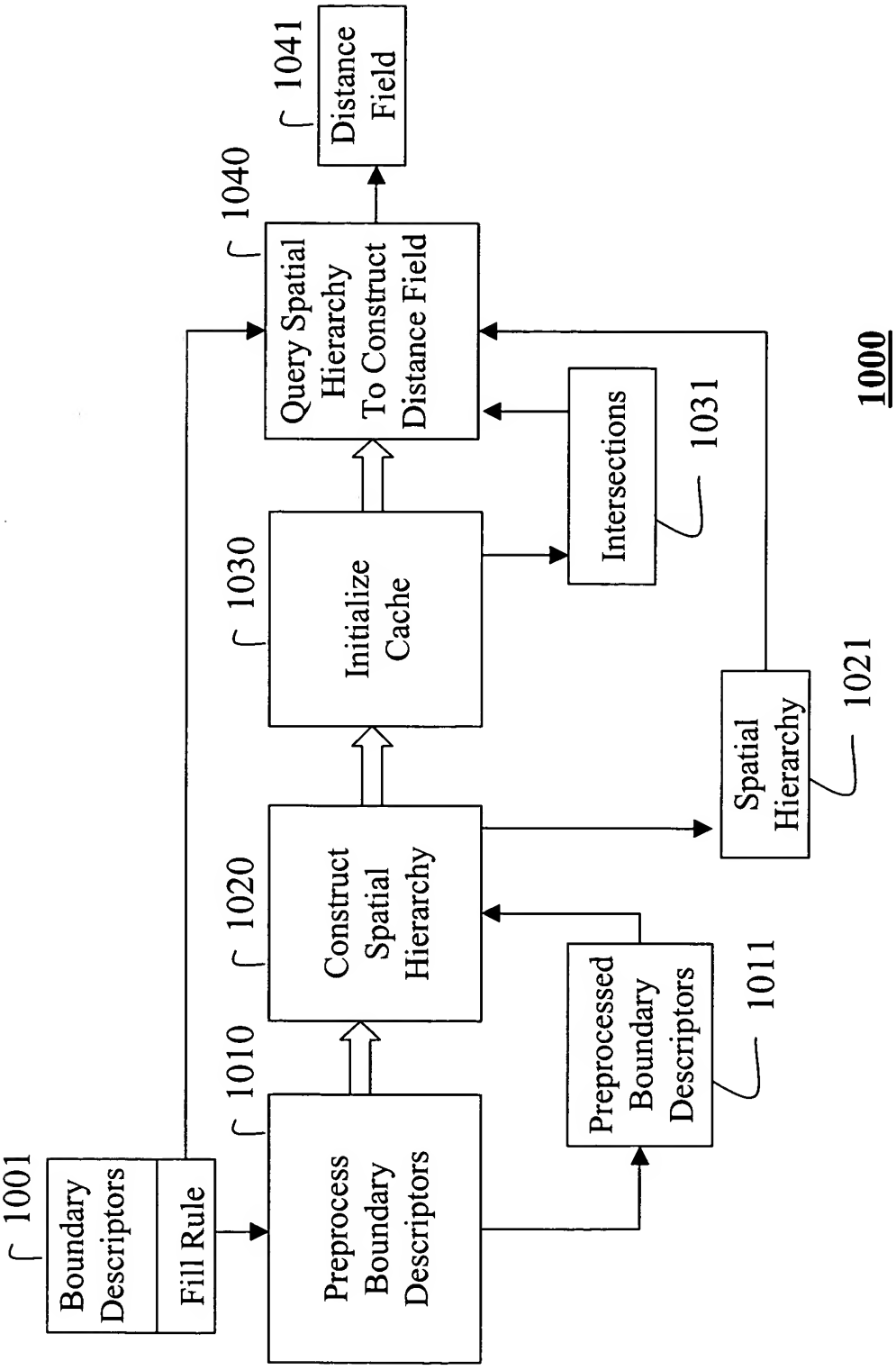

1001
Boundary Descriptors
Fill Rule
1010
Preprocess Boundary Descriptors
1011
Preprocessed Boundary Descriptors
1020
Construct Spatial Hierarchy
1021
Spatial Hierarchy
1030
Initialize Cache
1031
Intersections
1040
Query Spatial Hierarchy To Construct Distance Field
1041
Distance Field
1000

Fig. 10

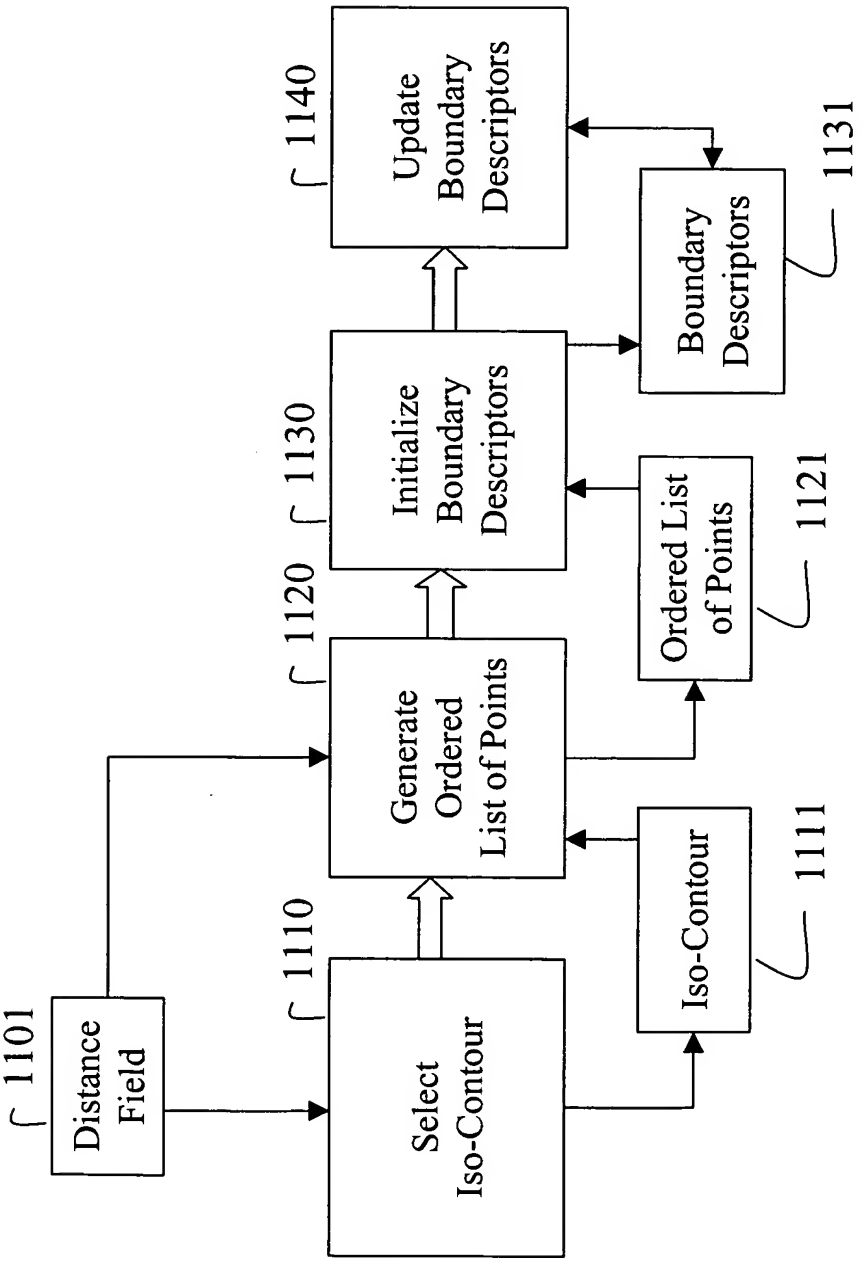
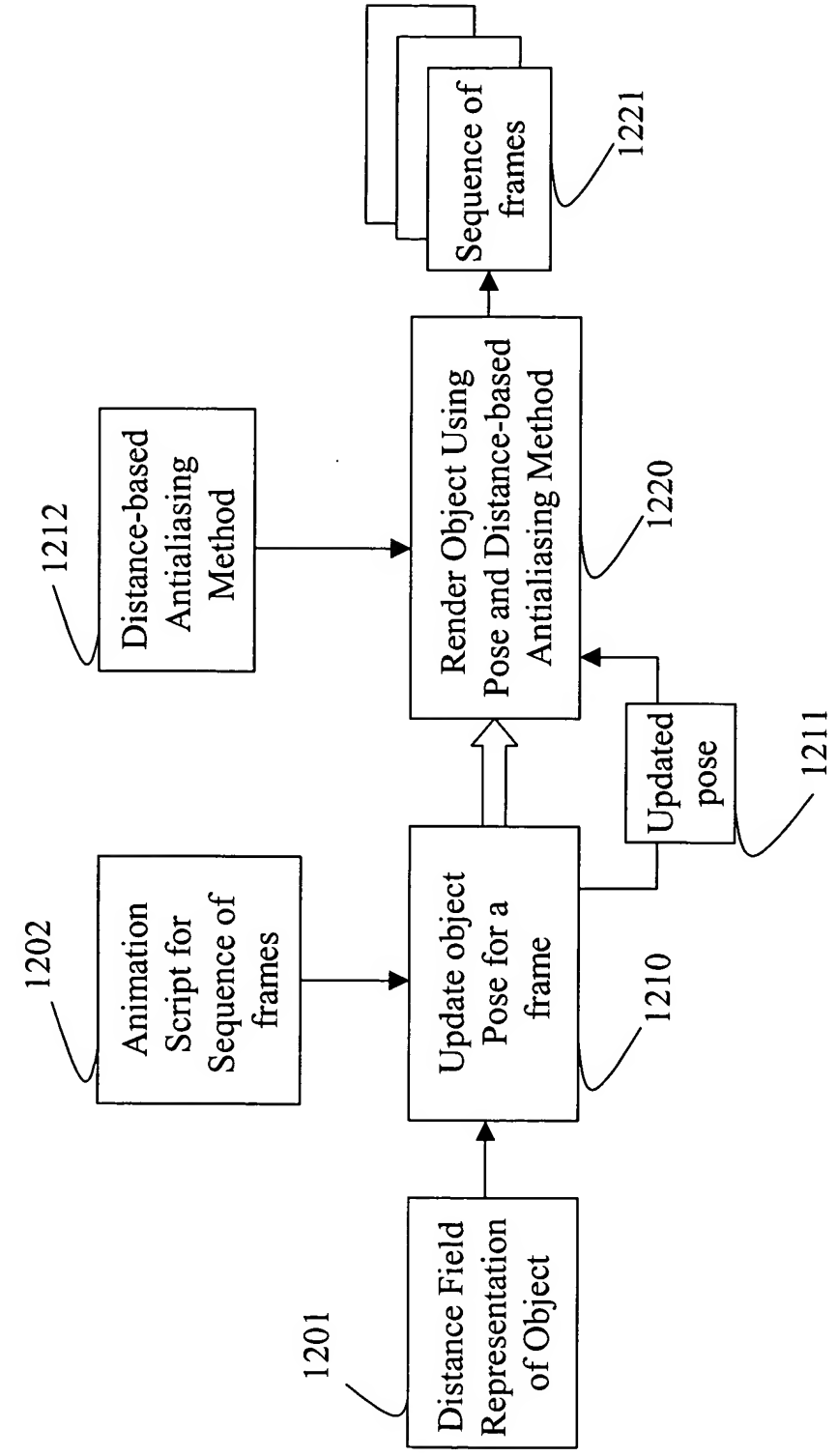
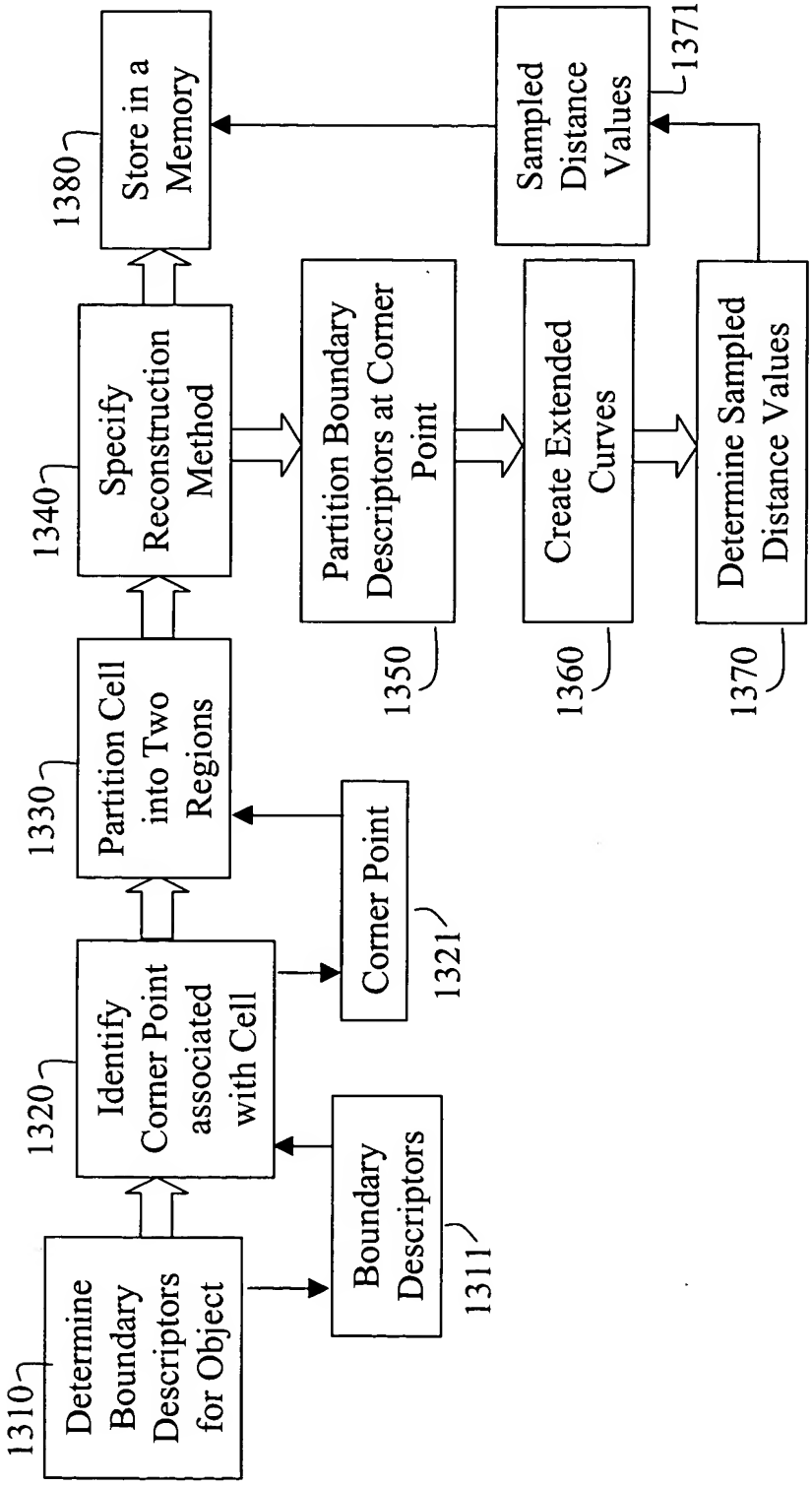

1101
Distance Field
1110
Select Iso-Contour
1111
Iso-Contour
1120
Generate Ordered List of Points
1121
Ordered List of Points
1130
Initialize Boundary Descriptors
1131
Boundary Descriptors
1140
Update Boundary Descriptors
1100

Fig. 11


Distance Field Representation of Object
1201
Animation Script for Sequence of frames
1202
Update object Pose for a frame
1210
Updated pose
1211
Distance-based Antialiasing Method
1212
Render Object Using Pose and Distance-based Antialiasing Method
1220
Sequence of frames
1221

1200

Fig. 12


1310
Determine Boundary Descriptors for Object
1311
Boundary Descriptors
1320
Identify Corner Point associated with Cell
1321
Corner Point
1330
Partition Cell into Two Regions
1340
Specify Reconstruction Method
1350
Partition Boundary Descriptors at Corner Point
1360
Create Extended Curves
1370
Determine Sampled Distance Values
1371
Sampled Distance Values
1380
Store in a Memory

1300

Fig. 13

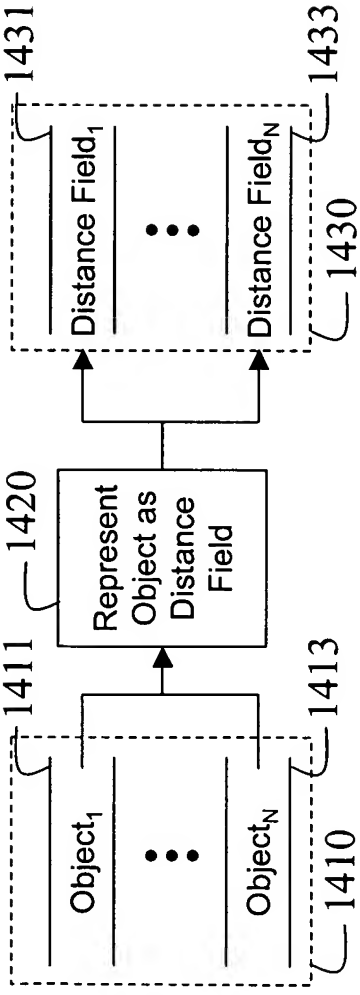


Fig. 14A

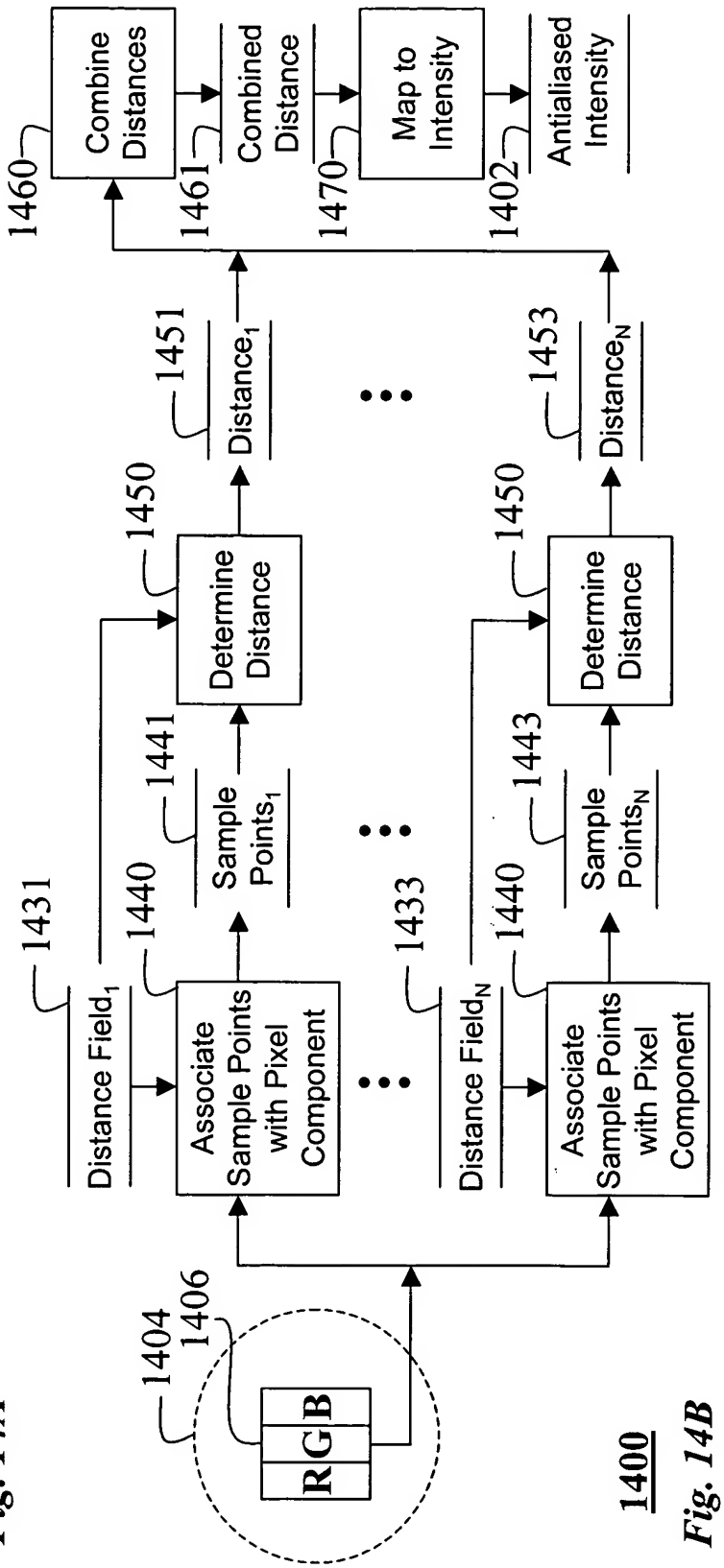
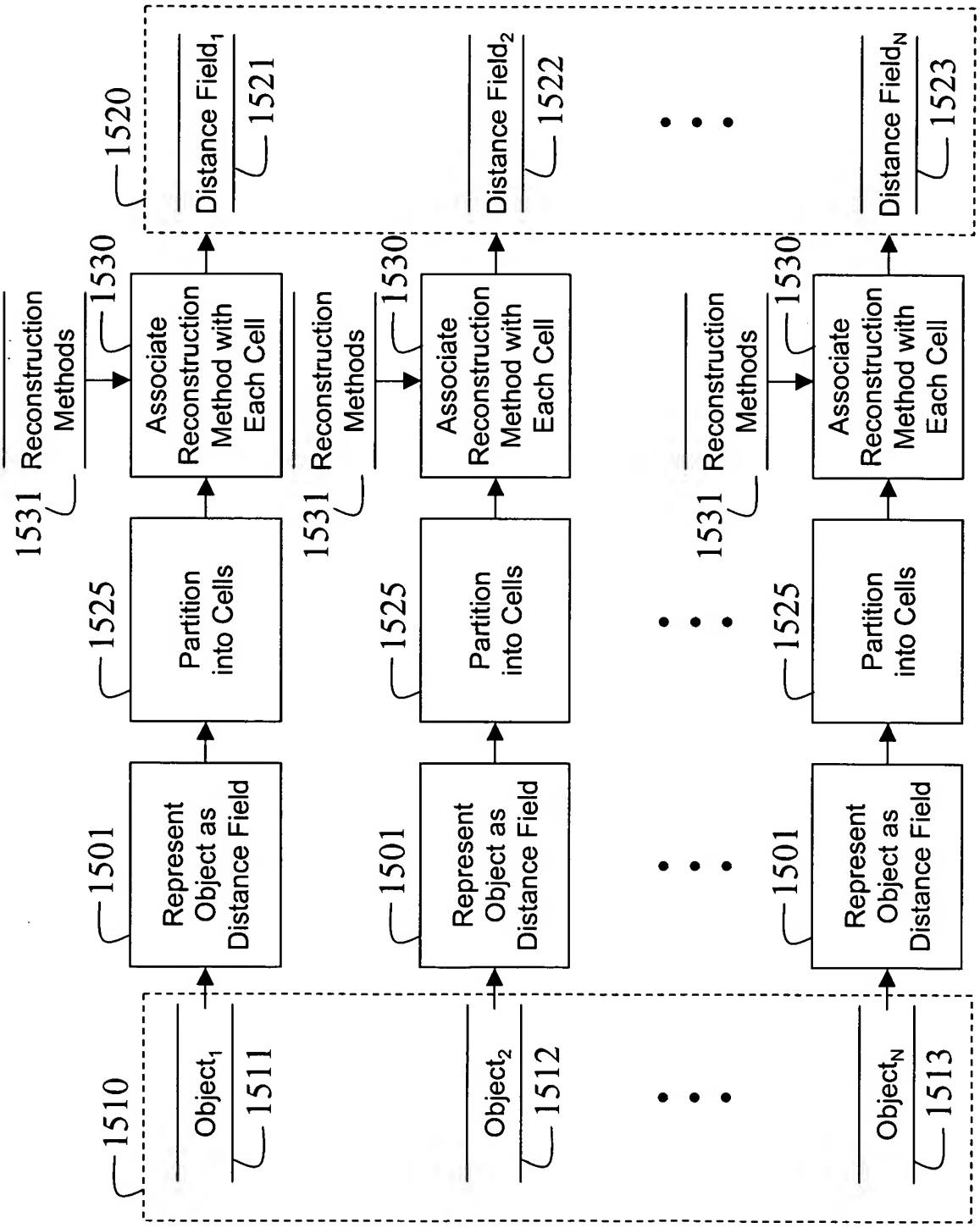


Fig. 14B

1500

Fig. 15A


1510
Object1
1511
Object2
1512
ObjectN
1513
1501
Represent Object as Distance Field
1525
Partition into Cells
1531
Reconstruction Methods
1530
Associate Reconstruction Method with Each Cell
1520
Distance Field1
1521
Distance Field2
1522
DistanceFieldN
1523

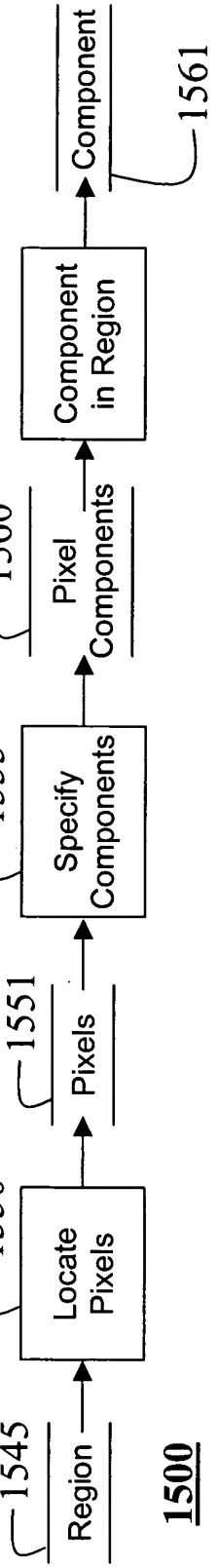


Fig. 15B

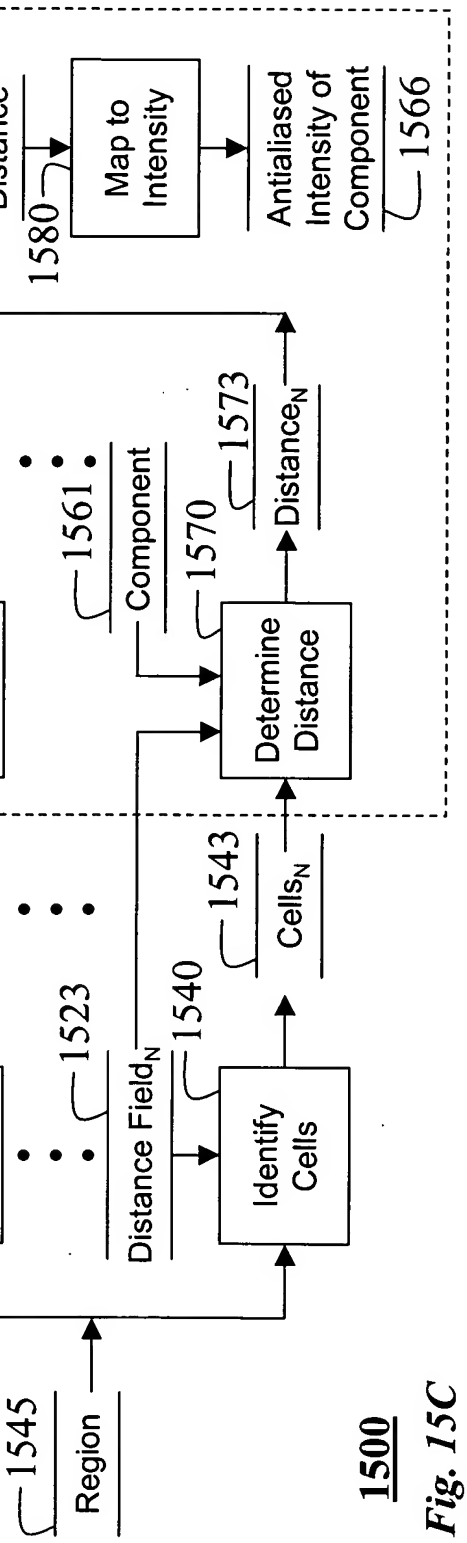
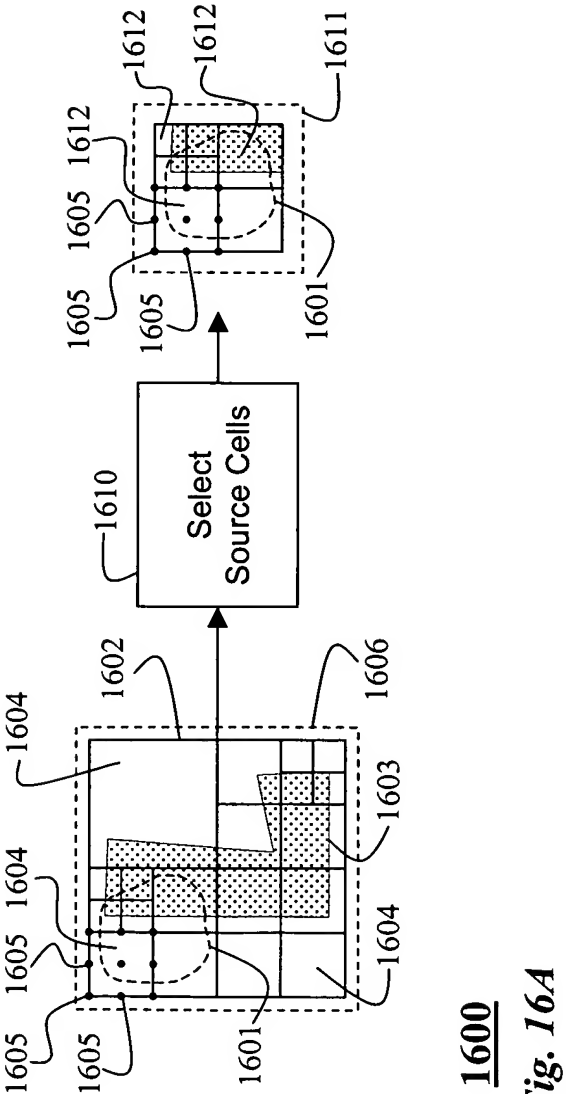
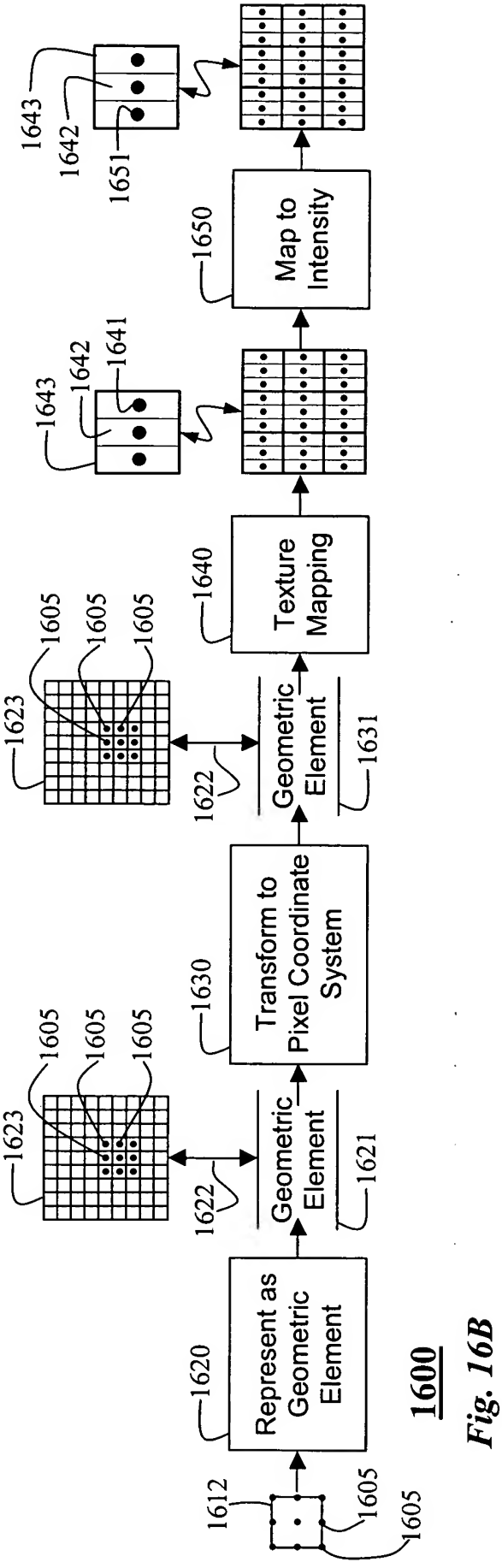


Fig. 15C



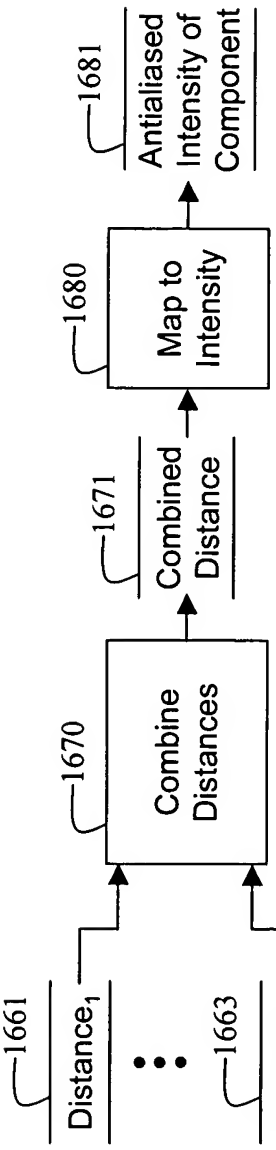
1600

Fig. 16A



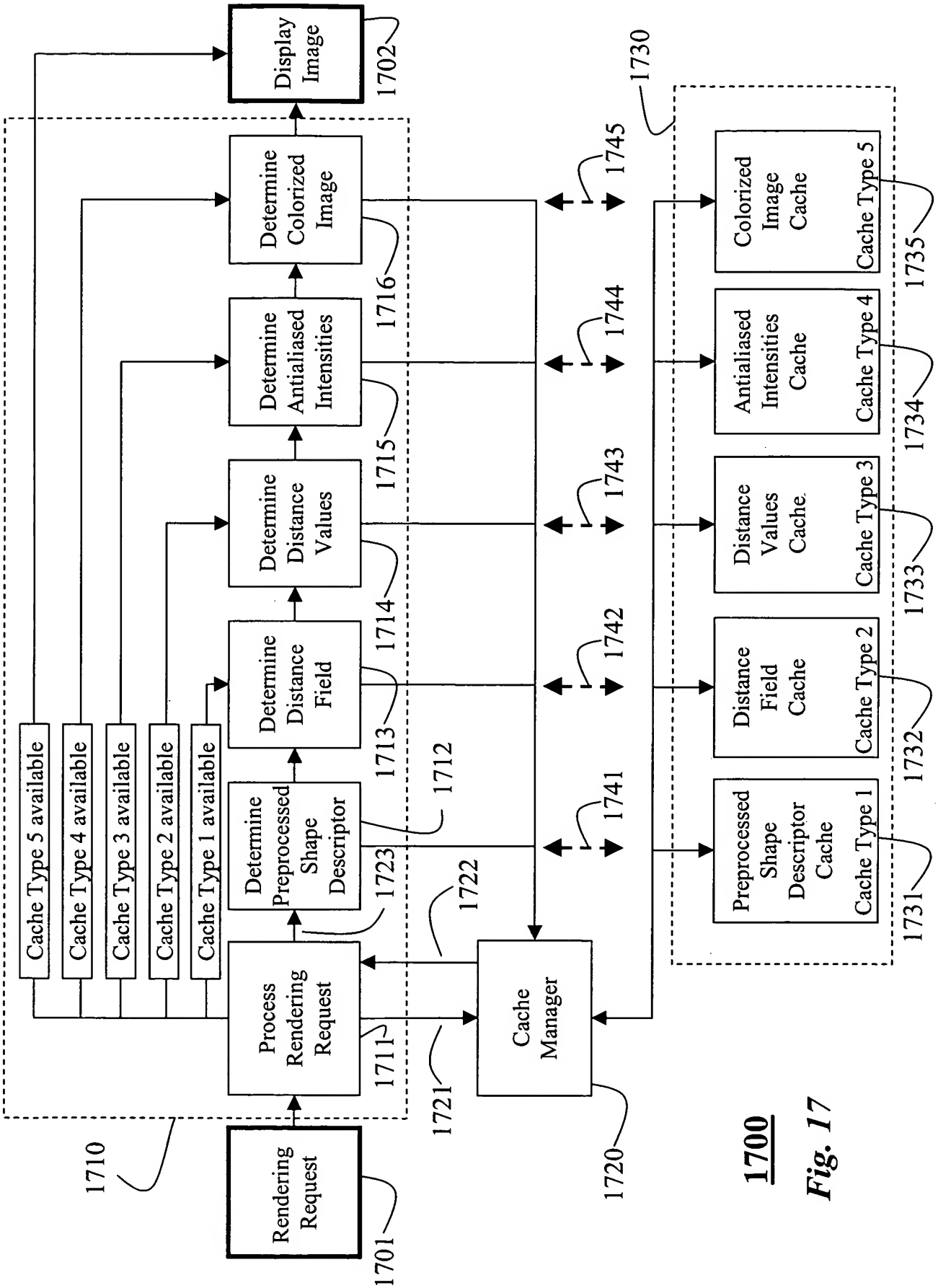
1600

Fig. 16B


1661
Distance$_1$
1663
Distance$_N$
1670
Combine Distances
1671
Combined Distance
1680
Map to Intensity
1681
Antialiased Intensity of Component

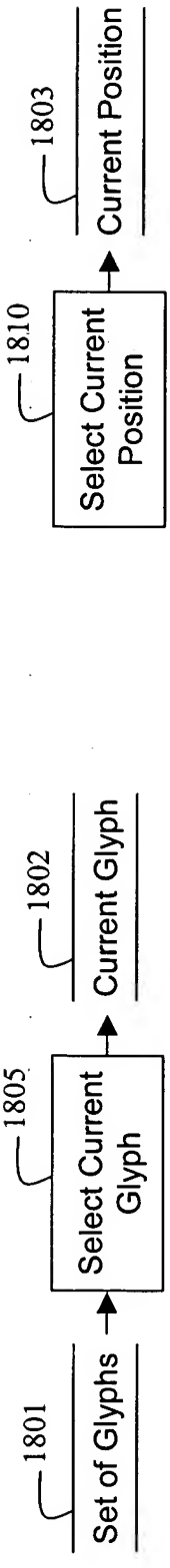
1600

Fig. 16C


Display Image
1702
Determine Colorized Image
1716
Determine Antialiased Intensities
1715
Determine Distance Values
1714
Determine Distance Field
1713
Determine Preprocessed Shape Descriptor
1723
1712
Process Rendering Request
1711
Rendering Request
1701
1710
Cache Type 5 available
Cache Type 4 available
Cache Type 3 available
Cache Type 2 available
Cache Type 1 available
1721
1722
Cache Manager
1720
1730
1745
1744
1743
1742
1741
Colorized Image Cache
Cache Type 5
1735
Antialiased Intensities Cache
Cache Type 4
1734
Distance Values Cache
Cache Type 3
1733
Distance Field Cache
Cache Type 2
1732
Preprocessed Shape Descriptor Cache
Cache Type 1
1731

1700

Fig. 17

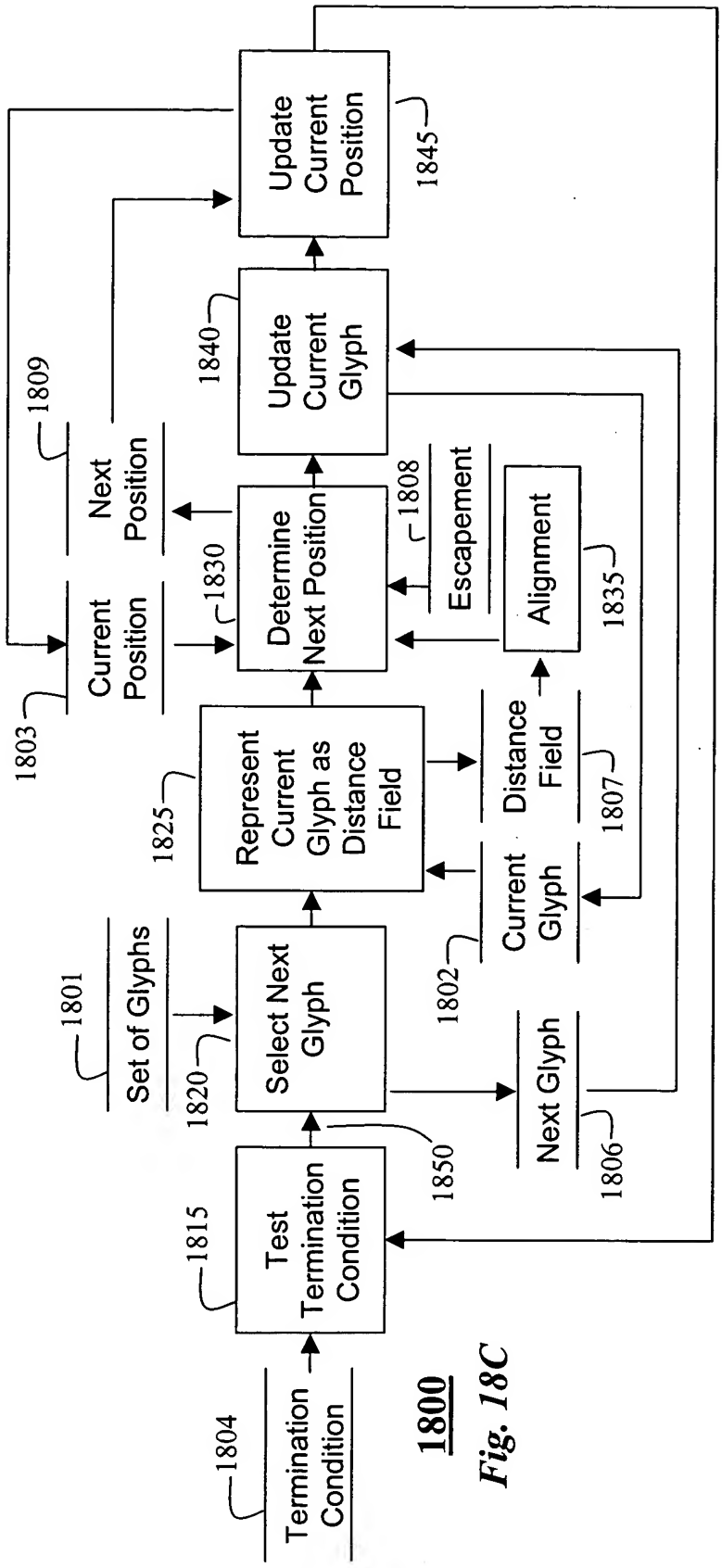


1800

Fig. 18A

1800

Fig. 18B



1800

Fig. 18C

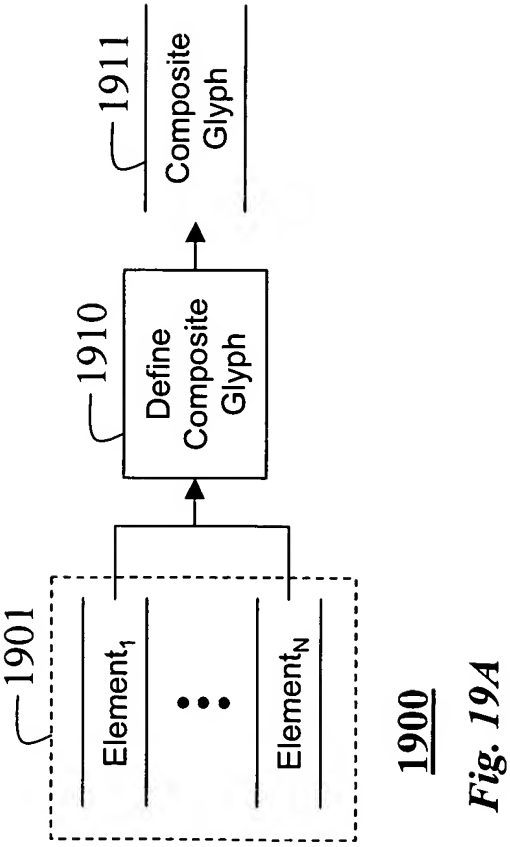


Fig. 19A

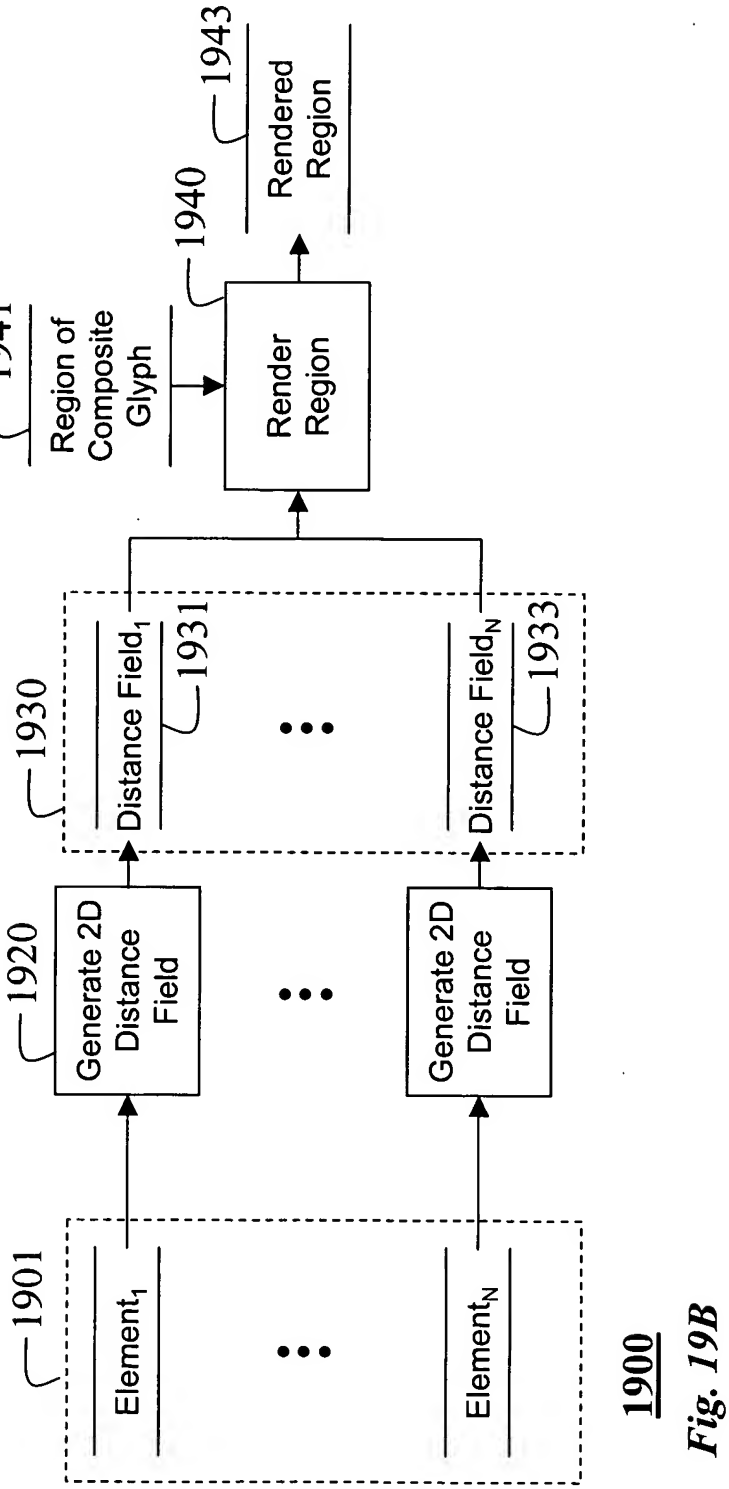
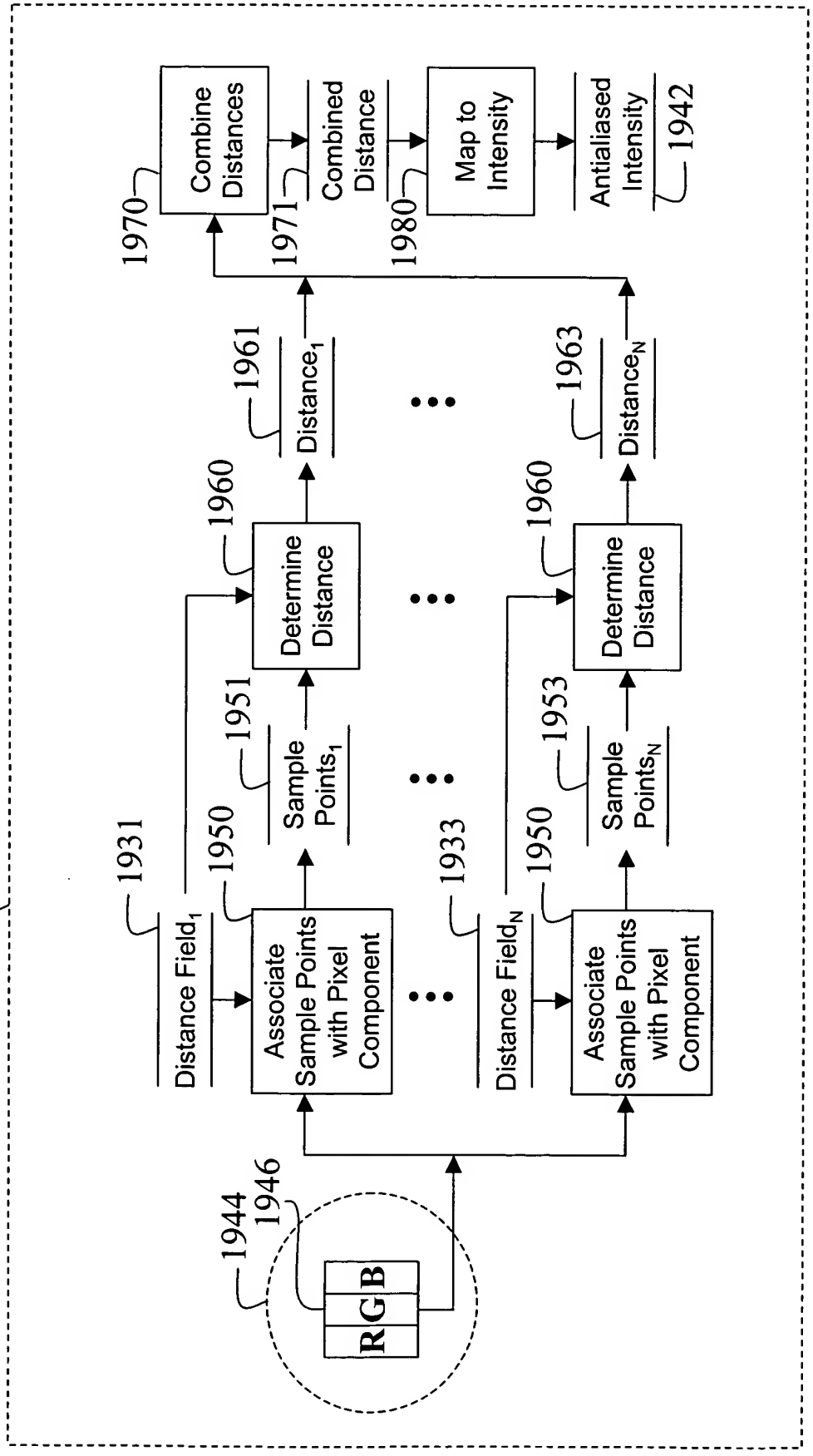


Fig. 19B

1900

Fig. 19C


1940
1931
Distance Field$_1$
1950
Associate Sample Points with Pixel Component
1951
Sample Points$_1$
1960
Determine Distance
1961
Distance$_1$
1933
Distance Field$_N$
1953
Sample Points$_N$
1963
Distance$_N$
1944
1946
RGB
1970
Combine Distances
1971
Combined Distance
1980
Map to Intensity
1942
Antialiased Intensity

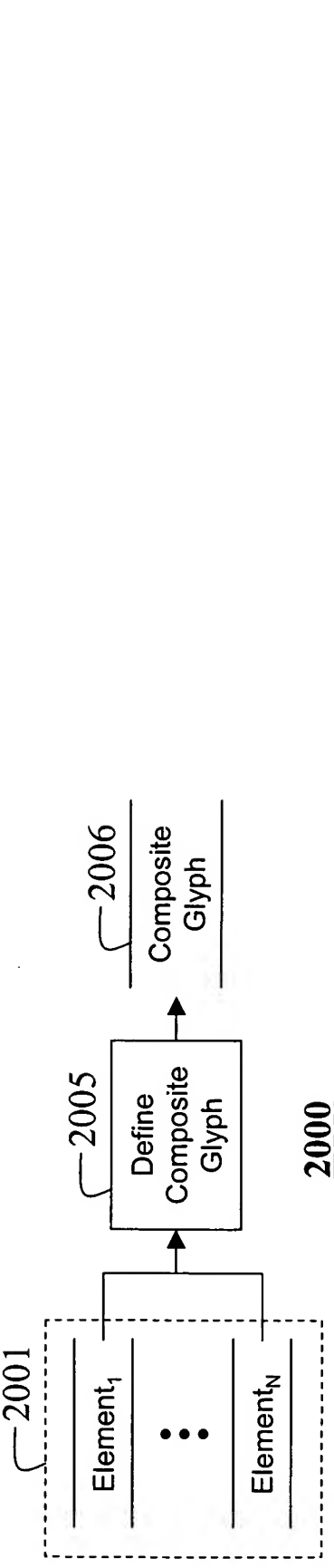


Fig. 20A

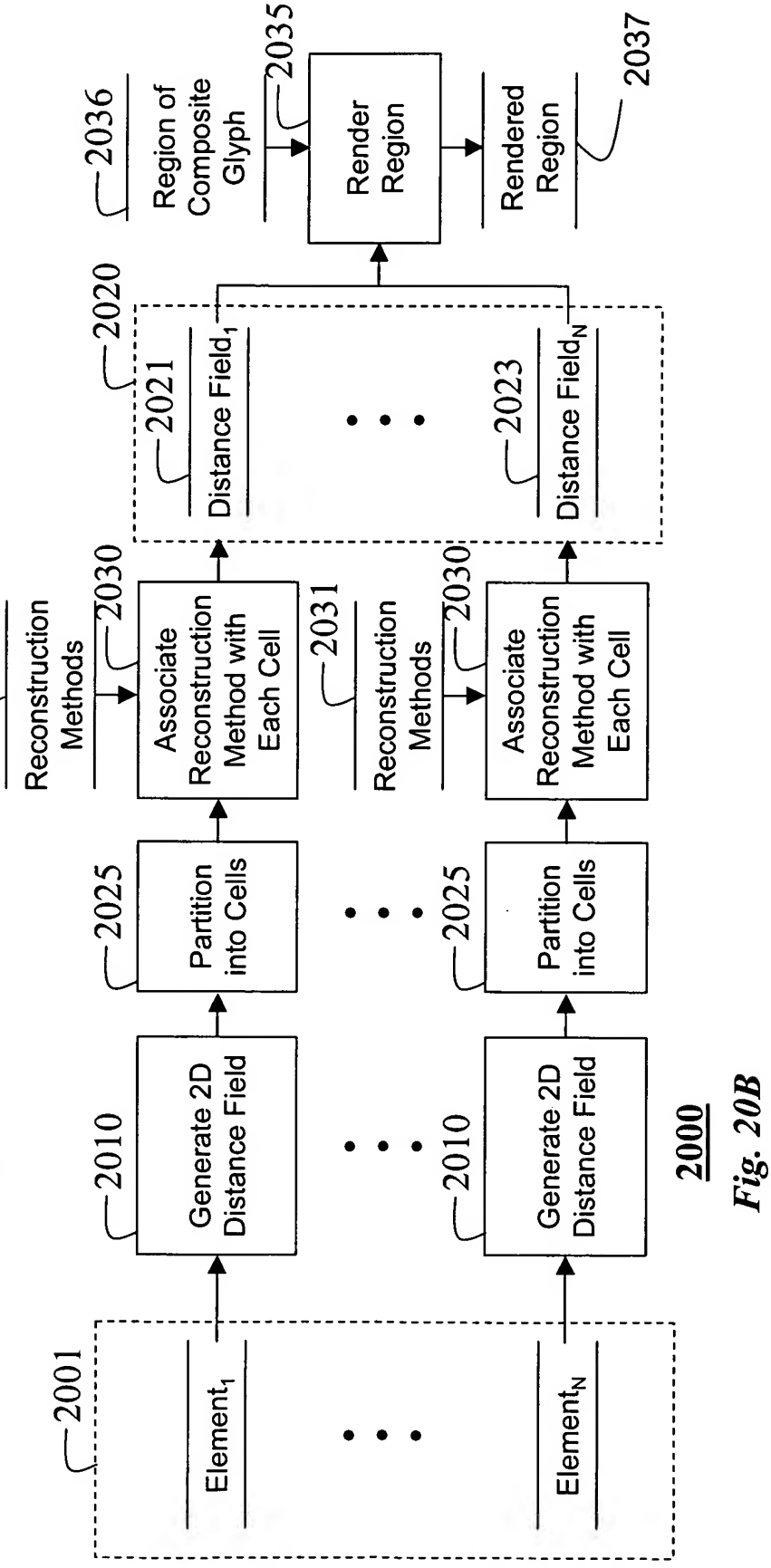
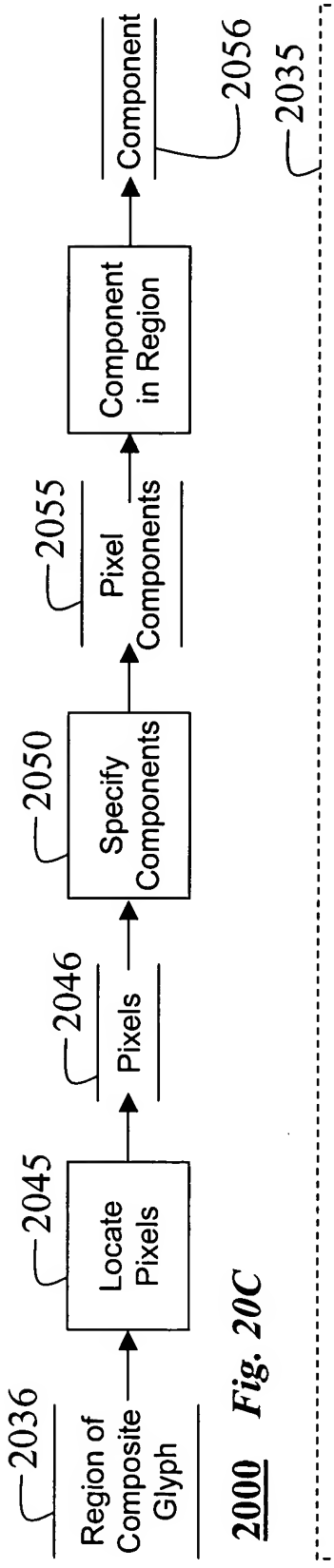
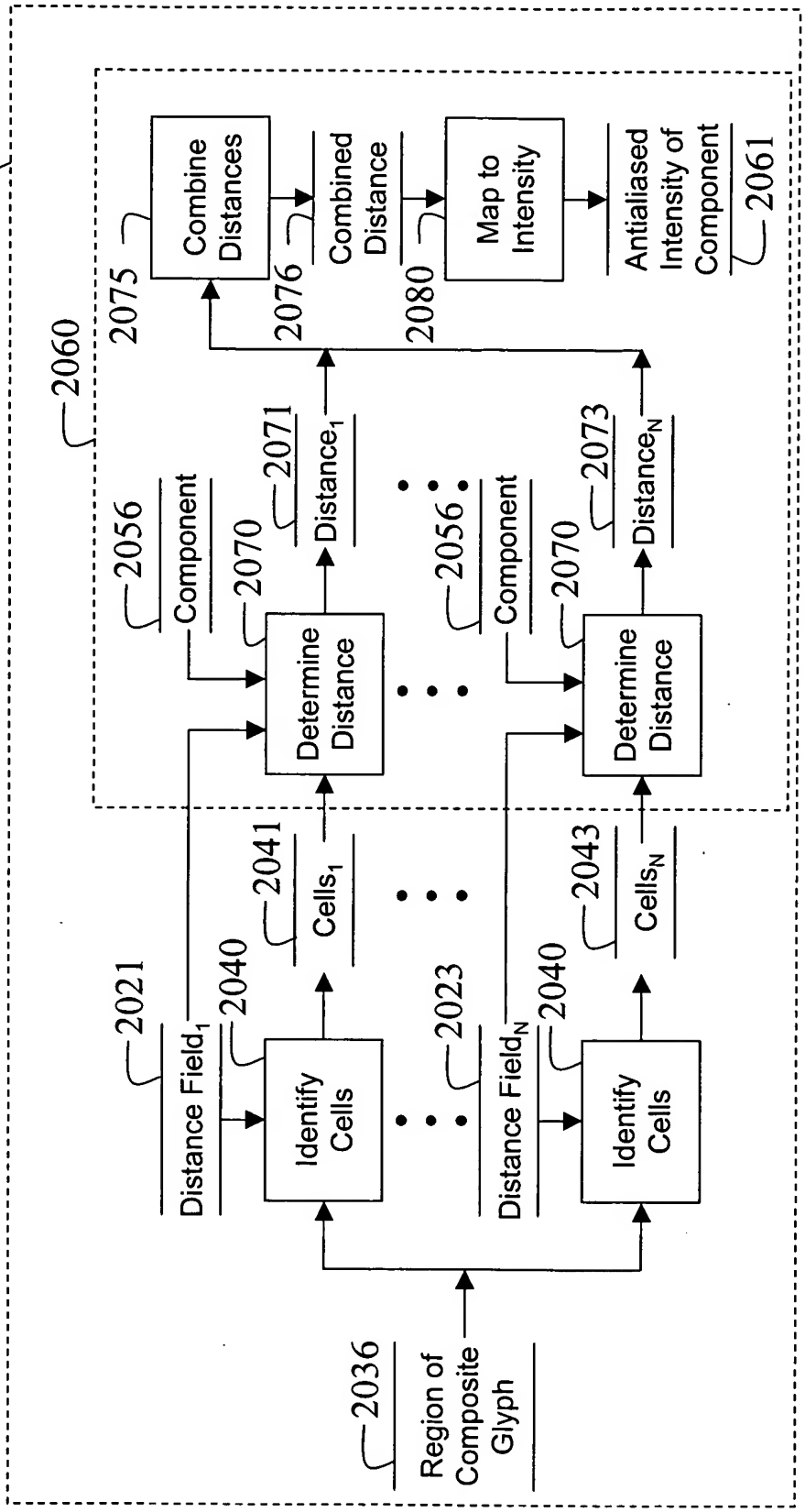


Fig. 20B



2000 *Fig. 20C*



2000 *Fig. 20D*

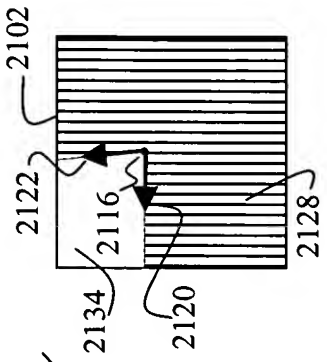


Fig. 21D

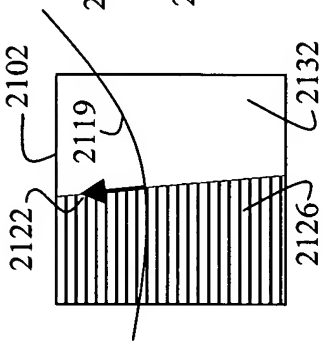


Fig. 21C

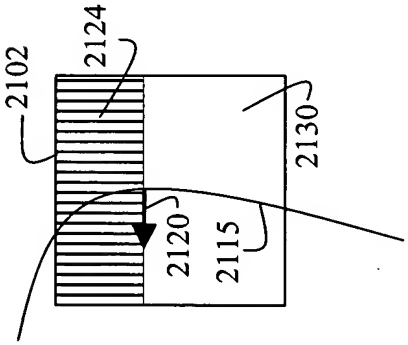


Fig. 21B

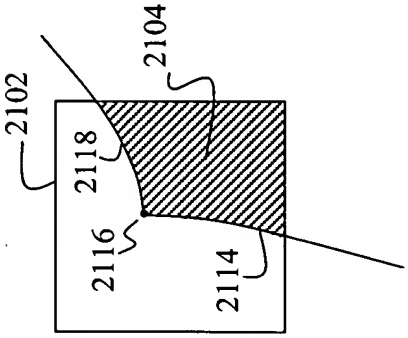


Fig. 21A

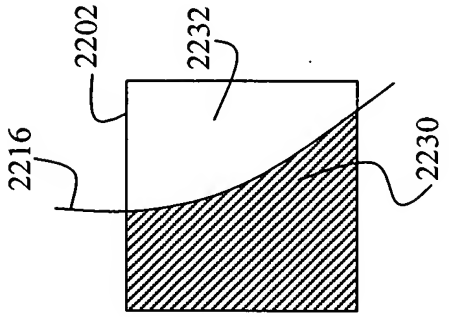


Fig. 22C

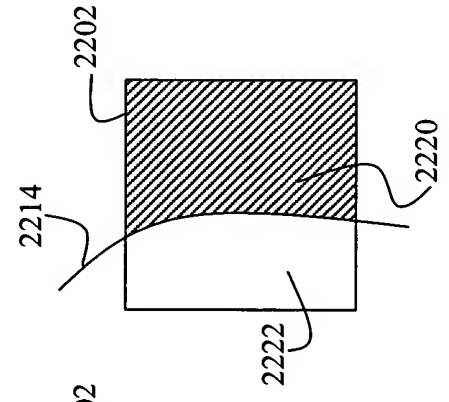


Fig. 22B

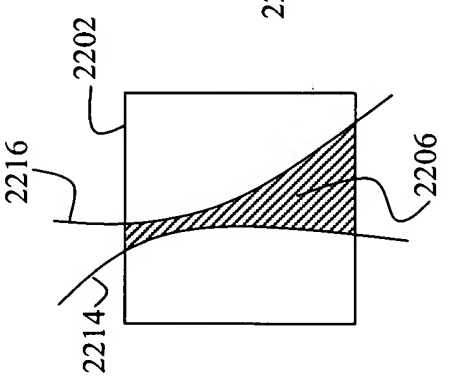


Fig. 22A

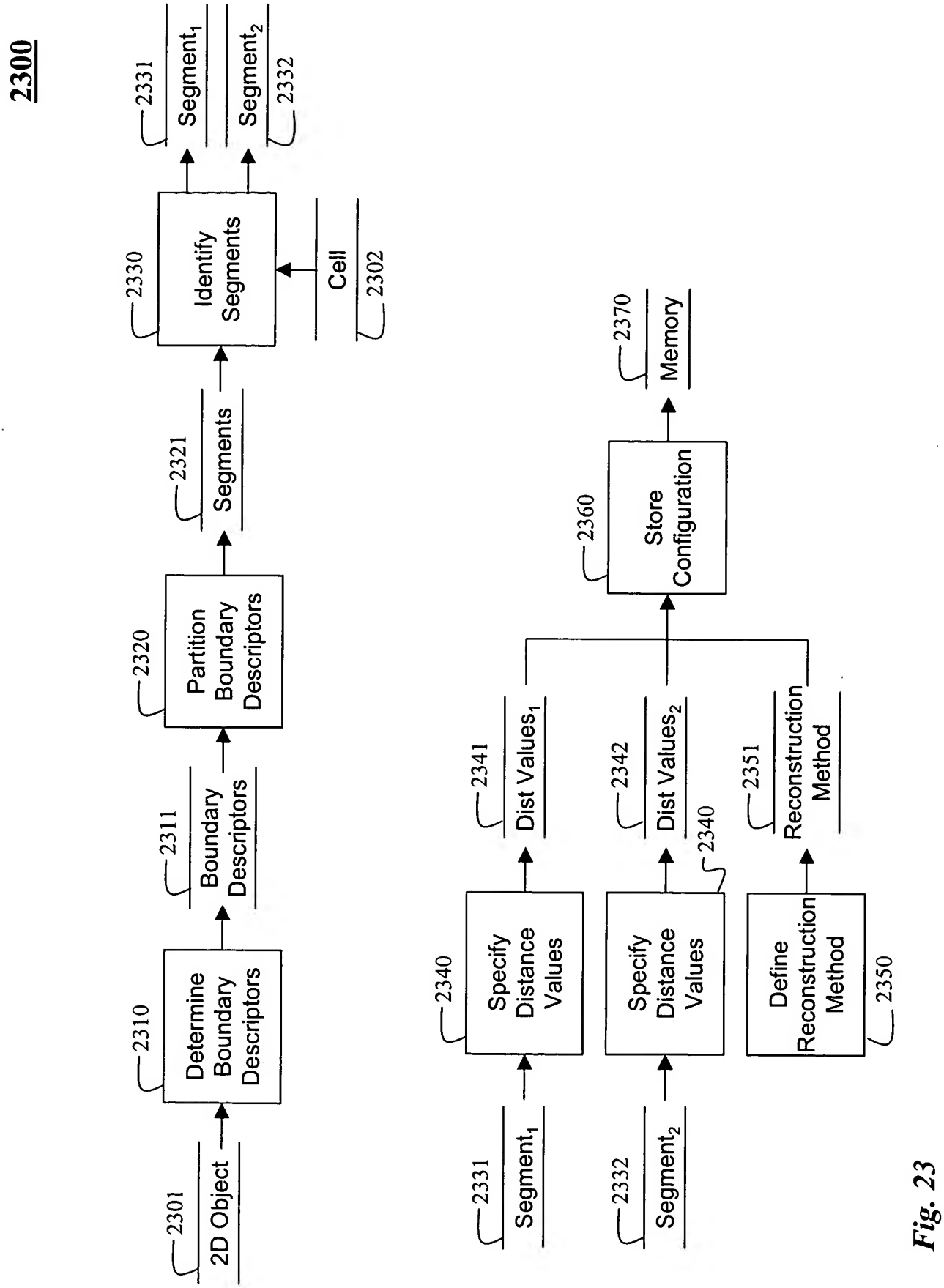

2300
2301
2D Object
2310
Determine Boundary Descriptors
2311
Boundary Descriptors
2320
Partition Boundary Descriptors
2321
Segments
2330
Identify Segments
Cell
2302
2331
Segment1
Segment2
2332
2331
Segment1
2340
Specify Distance Values
2341
Dist Values1
2332
Segment2
2340
Specify Distance Values
2342
Dist Values2
2340
2350
Define Reconstruction Method
2351
Reconstruction Method
2360
Store Configuration
2370
Memory

Fig. 23

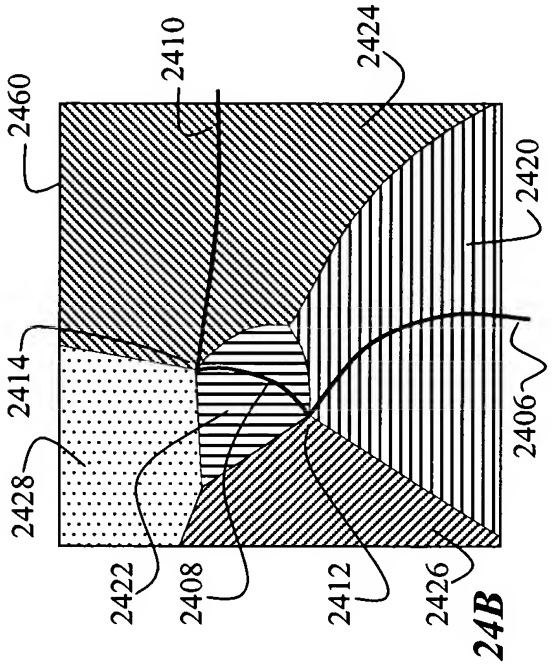


Fig. 24B

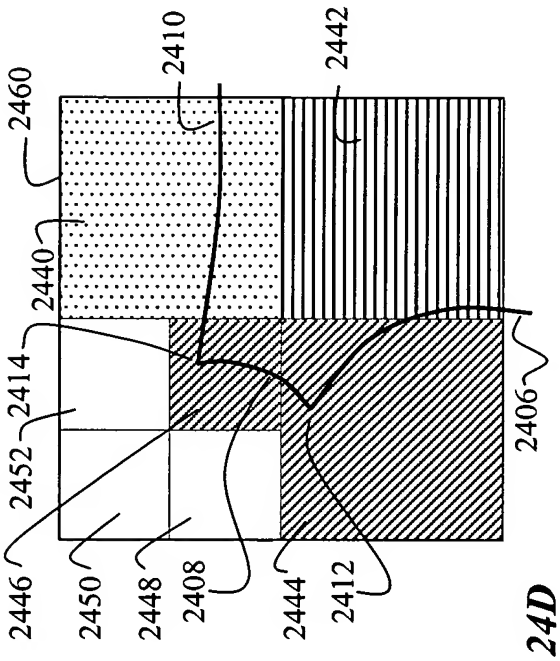


Fig. 24D

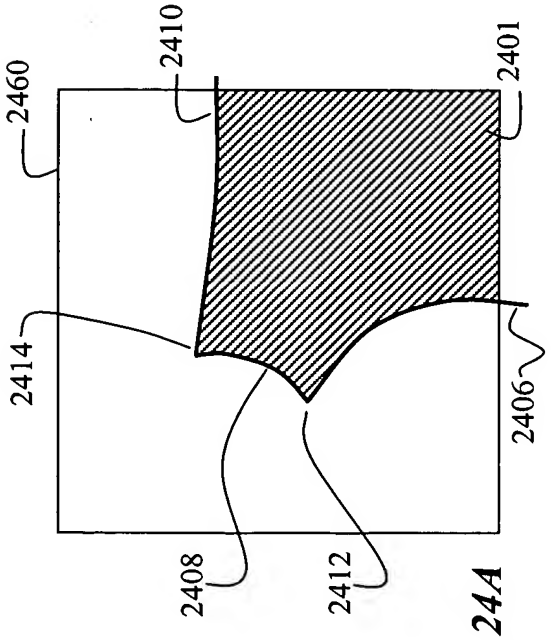


Fig. 24A

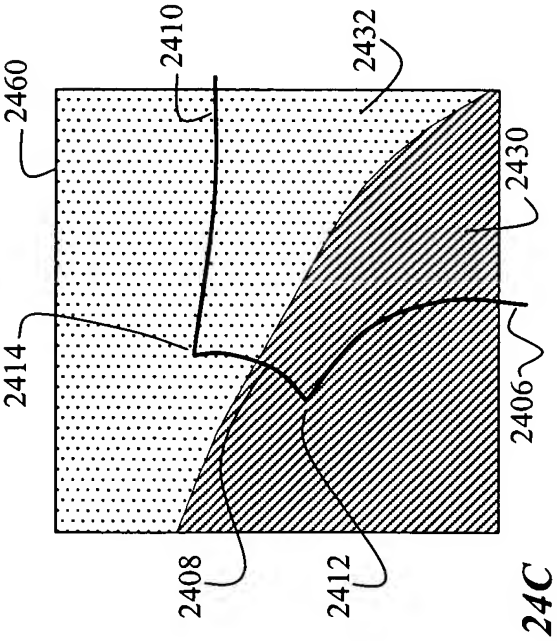


Fig. 24C

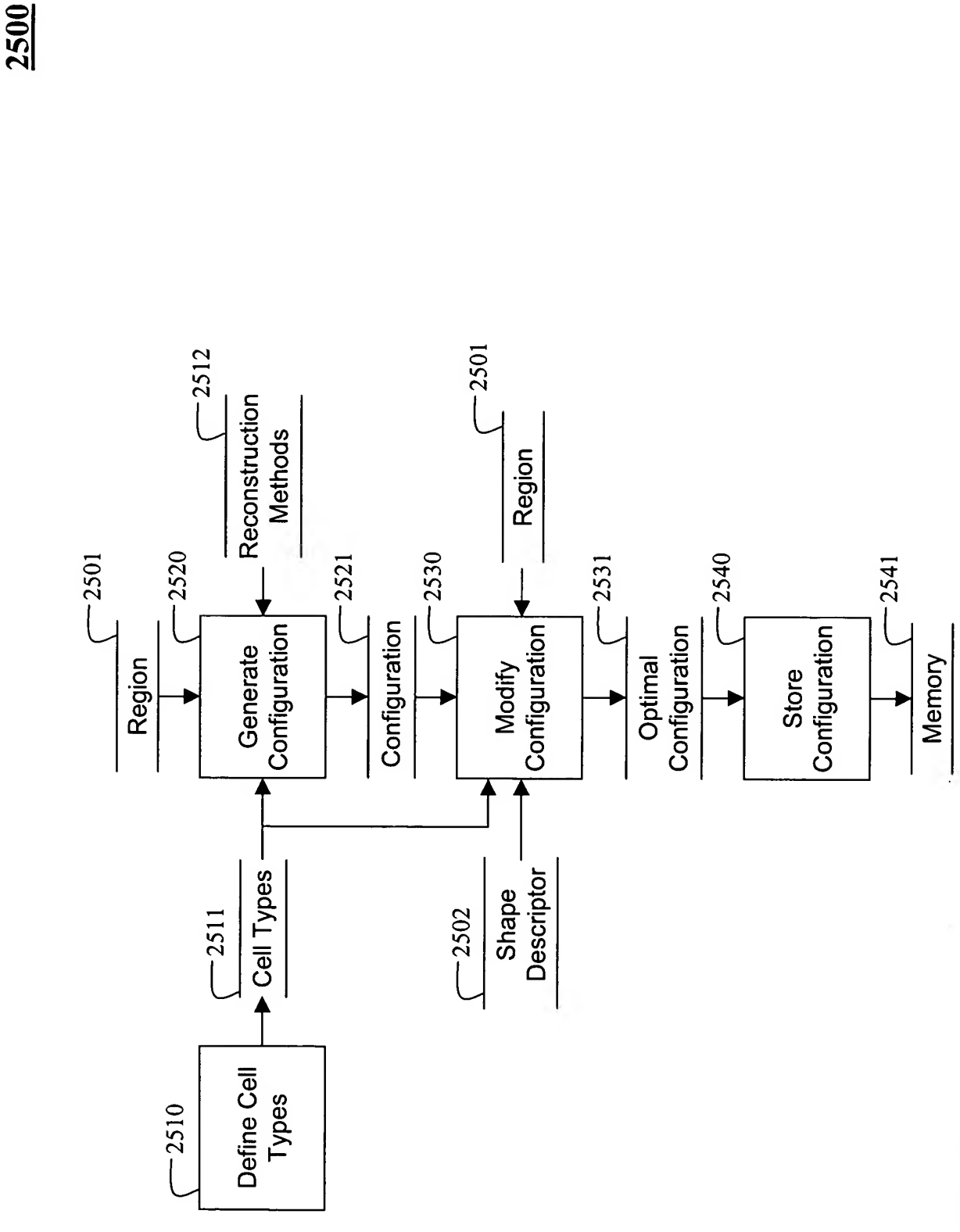

2500
2510
Define Cell Types
2511
Cell Types
2512
Reconstruction Methods
2501
Region
2520
Generate Configuration
2521
Configuration
2502
Shape Descriptor
2501
Region
2530
Modify Configuration
2531
Optimal Configuration
2540
Store Configuration
2541
Memory

Fig. 25